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In order to improve a low deposition speed in the process technology by which a damascene pattern of an ultra-fine structure is filled with copper by CVD method, a CECVD method is disclosed by which a chemical enhancer layer for increasing the deposition speed of copper is formed and the damascene pattern is then filled by means of MOCVD method using a copper precursor which forms a copper wiring.

A diffusion prevention film is formed on the sidewall of the damascene pattern in the shape of a spacer in order to prevent an increase of the via resistance by the diffusion of copper into the sidewalls of the damascene pattern. A chemical enhancer layer is selectively formed on a lower metal layer that is exposed by the damascene pattern, thus allowing a selective partial filling of the damascene pattern. Therefore, copper filling in an ultra-fine structure is facilitated which also minimizes the electrical resistivity of the copper wiring.